METHOD OF CREATING A CHORDING KEYBOARD MAPPING TABLE

TECHNICAL FIELD

[0001] The technical field of this invention is keyboards. More specifically, the technical field is chording keyboards. Even more specifically, the technical field is a method of creating a chording keyboard mapping table that maps keyboard chords to symbols.

[0002] A chording keyboard is one wherein a combination of keys, a "chord," may be depressed at one time to represent a symbol, and wherein such chords are part of the normal "typing" mode of the keyboard. Such keyboards are alternatively called chord keyboards, permuted keyboard or combinatorial keyboards.

BACKGROUND ART

[0003] Prior art patents include: U.S. Pat. No. 4,833,446; U.S. Pat. No. 5,184,315; U.S. Pat. No. 5,487,616; U.S. Pat. No. 5,642,108; U.S. Pat. No. 6,646,572; U.S. Pat. No. 7,259,751; and U.S. Pat. No. 8,542,195.

[0004] Researchers have previously attempted to optimize a chording keyboard table by measuring or using existing measurements of perceptual scores and motor scores of users typing chords on a chording keyboard for which the researchers wished to optimize. Another name for "score," in this context, is "cost," although favorability may be towards a higher score versus a lower cost.

[0005] One problem with this approach to optimization is that perceptual score and motor score for a user of a chording keyboard cannot effectively be separated. By attempting to measure these two scores independently, or by using independent research that did not use the precise keyboard to be optimized, effectively invalid information was used for the optimization. In some case, an arbitrary algorithm was employed, such as adding the two scores to produce a composite score, with no evidence that such a combination actually produced an optimal result.

[0006] Another weakness of the prior art was the use of a keyboard that required all keys on the keyboard to be released between chords. As compared to a preferred keyboard that permits each cord to transition directly to any next chord, the additional motor activity (more than twice as much motor activity) means that the results of those optimizations are unrelated optimization of the preferred keyboard.

[0007] Yet another weakness of the prior art methods is their use of measuring the cost of chords, as distinct from transitions. This is an extremely important difference, because a user's motor activity is entirely for creating the new chord, from the prior chord of the keyboard (which may be the chord of all keys released). That is, the motor activity is related to transitions, not chords. Thus, taking measurements tied to chords, not transitions, is fundamentally measuring the wrong thing with respect to identifying hand and finger motor costs; and thus does not properly optimize the chording keyboard map.

[0008] Yet another weakness of prior art is optimization in the placement of keys, typically as a distance from a resting state of a finger. This optimization may be appropriate for keyboard where a single finger must activate more than one key, but is ineffective optimization where all fingers, or all fingers except the thumb, operate only a single key.

[0009] Yet another weakness of prior art is using pure timing as a method to disambiguate chords. Such a method presents two problems, both of which reduce the validity of the results. First, this method requires a minimum typing speed and competence with the keyboard, because otherwise the slow chord generation of beginners causes extraneous chords to be recognized. Second, it enforces a maximum typing speed because otherwise a briefly held chord will not be recognized and will be skipped. These two constraints on typing speed eliminate two important classes of users: users who are just beginning to use a chording keyboard—the same users who will be making a purchase decision; and users who have selected the keyboard to support very fast typing—the reason users select a chording keyboard at all, plus those are they users who can recommend such a keyboard due to its higher maximum typing speed than a QWERTY keyboard. Thus, the use of pure timing for disambiguation fails to optimize for these two extremely important groups of users.

[0010] Yet another weakness of prior art that considers the cost of entering a chord, is the use of a one-dimensional cost table. That is, the table simply consists of S chords, with a numeric cost for each chord. If perceptual and motor scores are considered separately, then two such one-dimensional tables may be used.

[0011] Yet another weakness of prior art is frequency of letters in a corpus, or the frequency of letter pairs. This approach fails to take into account the many common letter sequences other than two letters. Consideration only of such static measurements fails to take into account the motor ease or difficulty associated with sequences as they actually occur in a text corpus. For example, in this prior art, common words such as "the," are considered as two unrelated pairs: "th" and "he." Similarly, portions of words such as "ing" or "tion" or not considered as groups.

[0012] The weaknesses of the prior art may be seen in the fact that not a single one of the research and development projects of the prior art has produced a widely adopted or commercially successful chording keyboard, or a one-handed keyboard, despite the obvious potential benefits of a one-handed keyboard, and the extensive amount of effort that has been devoted to trying to create an effective chording keyboard, over 35 years, from 1979 to the present.

DISCLOSURE OF THE INVENTION

[0013] Embodiments of this invention overcome the weaknesses and limitations of the prior art for creating an optimized chord table, also called a mapping table, for a chording keyboard.

[0014] A simplified scenario of one embodiment works as follows. An exercise for keyboard users, such as a video game, is created. The exercise presents as a challenge to a user to chord, using the keyboard, a series of chord transitions. The selected chord transitions are taken from a representative text corpus, although the exercise itself may not show any text from the corpus. The exercise measures the speed and accuracy at which the user is able to perform the transitions properly. Typically the user is presented with an award, such as points, for performing well, as a motivation to continue to use the exercise.

[0015] In some embodiments, the exercise or a variation using text, also serves as a teaching tool for users to learn how to use or type on the chording keyboard. As a user gains experience and her typing speed and accuracy improve, the